OBG

WORK PLAN

Facility Soil Vapor Work Plan

General Electric Company
GE Aviation Facility
Evendale, Ohio

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MATTHEW TRAISTER, VICE PRESIDENT
O'Brien & Gere Engineers, Inc.

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1. INTRODUCTION

O'Brien & Gere (OBG) has been retained by the General Electric Company (GE) to prepare a Work Plan for evaluation of the soil vapor pathway for selected buildings at the GE Aviation facility (Facility) located in Evendale, Hamilton County, Ohio (**Figure 1**). This Work Plan has been prepared in response to USEPA's comments on the Corrective Measures Study (CMS) Interim Report for soil vapor (OBG, 2015), which was submitted to USEPA on May 12, 2015. The comments, dated June 19, 2015, requested submittal of a Work Plan to conduct additional indoor air and sub-slab vapor sampling for selected buildings at the Facility, including Buildings 500, 700, 703, 800, B and C. This Work Plan presents a summary of the data gathering activities conducted in order to obtain information regarding each of the listed buildings. The information is then used to present a rationale for conducting sub-slab and indoor air sampling within these buildings.

1.1 SITE LOCATION

The GE Aviation facility is located on an approximately 400-acre site in southwestern Ohio, approximately ten miles north of Cincinnati. The Facility is a secure, highly active, long-term manufacturing facility located within the heavily industrialized I-75 corridor between Cincinnati and Evendale, Ohio. The Facility has been used for military and commercial aircraft engine manufacturing since the 1940s.

1.2 SITE BACKGROUND

Beginning in late 2006, GE conducted vapor monitoring activities at the Facility, primarily in the southern portion of the Facility formerly operated by the US Air Force and referenced as Former AFP 36 (OBG, 2007). As part of the first round of sampling, limited sub-slab and indoor air samples were collected within Buildings 700 and 800 (sub-slab and indoor air) and Buildings 500, 703, B and C (indoor air only). A summary of the soil vapor investigation activities and results was provided within the CMS Interim Report for the soil vapor pathway. USEPA provided feedback that indicated the offsite soil vapor pathway was incomplete and no further evaluation offsite was recommended beyond the southern property line. However, as mentioned above, USEPA requested that further evaluation of the on-site soil-vapor-to-indoor-air pathway be performed.

At the time of the 2006 sampling, each of the buildings was occupied by plant employees for 8-hour work shifts and contained active manufacturing operations. Buildings B and C were recently demolished in late 2015 and early 2016 as part of a site-wide campus renovation program. Indoor air samples collected in 2006 did not reveal CVOCs above applicable indoor air screening levels. The screening levels were re-evaluated as part of the 2015 Interim Report using updated guidance and attenuation factors from USEPA (USEPA, 2012) and the result of the evaluation was that there were no exceedences of TCE or PCE within indoor air samples. Based upon USEPA comments on the 2015 Soil Vapor Interim Report, screening levels for TCE and PCE in soil vapor and indoor air were lowered to reflect a target hazard quotient of 1, as shown in the table below. Recommended screening levels for industrial land use were modified to the following:

Industrial Soil Vapor Screening Levels (µg/m^3)		
Parameter	**Old**	**New**
Tetrachloroethene (PCE)	15,667	5,600
Trichloroethene (TCE)	1,000	280
Industrial Indoor Air Screening Levels (µg/m^3)		
Parameter	**Old**	**New**
Tetrachloroethene (PCE)	470	168
Trichloroethene (TCE)	30	8.4

1.3 OBJECTIVES

The objective of this Work Plan is to summarize the site-specific information gathered to date related to Buildings 500, 700, 703 and 800, and present a rationale and sampling plan for further evaluation of the soil vapor pathway at these buildings.

2. SITE-SPECIFIC BUILDING INFORMATION

As part of the preliminary assessment activities for the onsite soil vapor pathway investigation, OBG worked with GE personnel to obtain relevant, building-specific information. The USEPA response to the Interim CMS Report specifically stated that Buildings 500, 700, 703, 800, B and C be evaluated for the vapor pathway. Locations of these buildings at the Facility are provided in **Figure 1**. Buildings B & C were demolished between late 2015 and early 2016, with no plans to rebuild in these areas. Therefore, neither of these two building footprints were assessed further. The following subsections summarize the information obtained from GE.

2.1 BUILDING SUMMARIES

2.1.1 Building 500

General building details concerning Building 500 include the following:

- Construction Date: 1943
- Square footage
  - Total: 689,547
  - Basement: 195,276
- Primary Use: Office space, conference rooms, museum hallway, common areas
- General Observations: The basement area is mainly continuous, with air flow moving throughout the basement. Fire doors were observed separating the basement hallways from interior stairwells leading up to the first floor, which constitutes a mixture of manufacturing, research and development, laboratories and test cells. Columns within Building 500 run from west to east (from A through O) and from north to south (from 1 through 37) as a means of identifying locations.

During review of documents provided by GE, the following detailed information was provided for Building 500. **Figure 2A** presents a visual summary of this information:

- Slab Thickness and Condition: Varies from 8-10 inches; piers at the base of columns can be as thick as 22 inches beginning at the base of the slab and can range from 3 feet to 10 feet in diameter. OBG observed no obvious large-scale cracks (greater than 1-inch wide), areas of settling or exposed soils or subbase material within the basement area. Only areas where the concrete was not covered by flooring or obscured by stored items were visually observed.
- Occupancy and Planned Renovations: During an OBG site visit conducted in late 2015, a majority of the cubicles/office spaces in the southern portion of the basement were unoccupied, while the central and northern office areas were occupied. Aside from a small area in the northern portion of the basement, no renovations were being conducted and according to GE, none are reportedly planned for 2016.
- Chemical Inventory: OBG obtained information from the 2016 chemical inventory listing from GE personnel. As the chemical inventory for the GE Aviation facility is extensive, OBG submitted the names and CAS numbers of the 11 chlorinated solvent compounds for which this soil vapor study is focused:
  - Trichloroethene (TCE)
  - Tetrachloroethene (PCE)
  - Carbon tetrachloride
  - Chloroethane
  - 1,1-Dichloroethane (1,1,-DCA)
  - 1,2-Dichloroethane (1,2-DCA)
  - 1,1-Dichloroethene (1,1-DCE)
  - *cis*-1,2-Dichloroethene (cis-1,2-DCE)
  - *trans*-1,2-Dichloroethene (trans-1,2-DCE)
  - 1,1,1-Trichloroethane (1,1,1-TCA)
  - Vinyl Chloride (VC)

Once these compounds were imported into the chemical inventory database, a listing of chemicals/products that include these compounds was provided to OBG, along with their locations by floor and column number. In reviewing the information obtained for Building 500, trade products containing one or more of these chemicals were identified. However, each of these materials was identified as being located on the first floor.

- Flood Potential: OBG reviewed a GE-provided Flood Survey conducted in 2010 by CDM Smith. The survey was conducted as a follow-up to a significant 100-year flood event that occurred at the Facility in 2001. The study concluded that the northern half of the western basement hallway as well as a majority of the northeastern basement would likely flood during a significant storm event. The report cited high groundwater elevations as a reason for potential flooding. There is a pedestrian and utility tunnel leading from the northern end of Building 500 to Building 200. The tunnel likely serves as a pathway for elevated groundwater levels, resulting in hallway flooding.
- Heating, Ventilation and Air Conditioning (HVAC) Systems: In communicating with GE personnel, the number of HVAC units within Building 500 were too numerous to individually locate and evaluate. However, GE personnel indicated that HVAC units within the basement of the building are supplied fresh air from air intakes at grade around the perimeter of the building. First floor and mezzanine areas are supplied fresh air from roof-mounted units.
- Utilities: According to utility plans, both process and sanitary sewer lines are present below grade, mainly within the existing hallways of the basement. Other identified utilities include water, electric and oil separator lines, most of which fall outside of the perimeter of the basement. However, based on first floor manufacturing, it is likely these utilities are above-ground and run above the basement ceiling and below the first floor. Although these utility corridors could serve as a preferential pathway for subsurface vapor transmission, there is no evidence of CVOC-impacted groundwater in proximity to the building that could act as a potential source of vapor migration to the building, as discussed below.
- Groundwater Data/Monitoring Wells: OBG reviewed the monitoring well database for the Facility and identified three wells, each located to the south of Building 500, in an estimated down-gradient direction from the building. Two of the wells were sampled in June 2015 while the third has not been sampled since 2001. Results indicate that one of the wells was non-detect for the "TCE Group," identified as a total of TCE, PCE, VC, cis-1,2-DCE and trans-1,2-DCE. The other two wells had TCE Group totals of 2.3 and 12.68 micrograms per liter (µg/L), levels near the USEPA Maximum Contaminant Level (MCL) of 5.0 µg/L for TCE and PCE. Given the industrial nature of the operations at the Facility, CVOCs at these concentrations are not likely to result in vapor pathway issues. Moreover, many of the current and historical manufacturing activities at the Facility have not occurred in areas up-gradient of Building 500 to the north, making it a less likely candidate for vapor migration issues.
- Differential Pressure Measurements: OBG utilized a digital micro-manometer and a smoke pen to monitor indoor air flow conditions and movement within the Building 500 basement area. OBG went to several places within the basement, as depicted on **Figure 2A**, concentrating on measuring the difference in air pressure between the basement areas and fire doors and exterior doors that lead to the first floor or directly to the building exterior. In order to collect measurements, OBG personnel connected a length of tubing to one inlet of the micromanometer and extended it beneath either the fire doors or exterior doors and into a different part of the building. The digital output reading was then recorded, with a negative number indicating negative pressure situations and a positive number indicating positive pressure situations. The value of the number directly correlates to the differential, with higher numbers indicating faster and increased air movement. **Table 1** summarizes the micromanometer readings obtained as part of the study.

  Overall, on the basis of limited visual observations and data collected by OBG, the building appears to be negatively pressured with respect to ambient pressure. Air generally moves from the basement to the first floor, and is likely attributable to the ventilation equipment and process exhausts located on the first floor. That is, relative to the basement, air was largely observed to be drawn into the basement from exterior doors. The air was then observed to subsequently flow toward the interior fire doors within the basement and up to

the first floor manufacturing areas. In this situation, air was being drawn up to the first floor from the basement due to higher intake sources within the area of manufacturing. Significant pressure differentials were observed in most testing locations, indicating adequate air movement.

2.1.2 Buildings 700/703

General building details concerning Buildings 700/703 include the following:

- Construction Date: 1942
- Square footage
  - Total: 1,981,215
  - Basement: 256,530 (241,685 in 700; 14,665 in 703)
- Primary Use
  - Building 700: Conference rooms, restrooms, small storage areas, office/classroom areas and a large storage area off of the east hallway
  - Building 703: Single hallway with a single unoccupied storage area
- General Observations: The main east-west trending hallway beneath 700 and 703 daylights to the east and exits the east side of Building 703 at grade. The north-south trending hallway is connected via tunnel to the basement of Building 800. None of the areas within the basements of Buildings 700 and 703 appeared to be under construction or renovation during the reconnaissance conducted in 2015 and 2016. The first floor of Building 700 represents the largest Facility area of engine manufacturing, while the first floor of Building 703 contains test cells for engines. Columns within Buildings 700 and 703 run from west to east (from A through Yd) and from north to south (from 1 through 15) as a means of identifying locations.

During review of documents provided by GE, the following detailed information was provided for Buildings 700/703. **Figure 2B** presents a visual summary of this information:

- Slab Thickness and Condition: Approximately 6 inches; piers at the base of columns can be as thick as 22 inches beginning at the base of the slab and can range from 3 feet to 10 feet in diameter. OBG observed no obvious large cracks (greater than 1-inch wide), areas of settling or exposed soils or subbase material within the basement areas. Only areas where the concrete was not covered by flooring or obscured by stored items were visually observed.
- Occupancy and Planned Renovations: During an OBG site visit conducted in late 2015 for Building 700, much of the office space was inaccessible due to security measures (contracts and DoD administration) and are presumed to be occupied. Smaller unoccupied areas were either used for storage or were empty. Two larger storage areas were present and filled with office furniture and other items on pallets. No renovations were observed within the basement of Building 700 during the 2015 and 2016 reconnaissance and none are reportedly planned for 2016. Limited items were being stored within the small storage space in Building 703. No ongoing renovations were observed within Building 703 and none are reportedly planned for 2016.
- Chemical Inventory: OBG obtained information from the 2016 chemical inventory from GE personnel in the same manner described for Building 500 above. In reviewing the information obtained for Buildings 700 and 703, trade products containing one or more of these chemicals were identified. However, each of these materials was identified as being located on the first floor or within test cells and away from the basement areas.
- HVAC Systems: Similar to Building 500, the number of HVAC units within Buildings 700 and 703 were too numerous to individually locate and evaluate. HVAC units within the basements of the building are reportedly supplied fresh air from air intakes at grade around the perimeter of the buildings. First floor and mezzanine areas are supplied fresh air from roof intakes.
- Flood Potential: The Flood Survey conducted in 2010 by CDM Smith concluded that the entirety of the basement was flooded as part of the 2001 event, but attributed the flooding to inadequate sump systems and

a former foundation located for Building 701 to the west of 700. High groundwater elevations were not cited within the area and pending the ongoing maintenance of the sump pumps, flooding should not occur within the basement. Reportedly, the slab was made thicker in the western portion of the basement of Building 700 by 4-inches following the 2010 flood study.

- Utilities: According to utility plans, process and sanitary sewer lines are present below grade, mainly within the hallways of the basement. Other identified utilities include water, electric and oil separator lines, most of which fall outside of the perimeter of the basement. However, based on first floor manufacturing, it is likely these utilities are above-ground and run between the first-floor and the basement.
- Groundwater Data/Monitoring Wells: OBG reviewed the monitoring well database for the Facility and identified four wells along the north side of the building, each located to the south of Building 500. Three of these wells were described in Section 2.1.1 above and did not contain total TCE Group concentrations above 12.68 µg/L. Five additional wells are located to the south of Building 700 and east of Building 703. Of these wells, the two located to the east of 703 were non-detect for TCE Group components, while a well to the southwest of 700 was also non-detect. Two wells located adjacent to the south of 700, identified as AOC LDMW-1S and AOC LDMW-3S, exhibited total TCE Group concentrations of 197.5 and 171.7 µg/L, respectively. The sample collected from AOC LDMW-1S was collected in June 2015, while the sample from AOC LDMW-3S was collected in 2001.
- Differential Pressure Measurements: OBG utilized a digital micro-manometer and a smoke pen to monitor indoor air flow conditions and movement within the Building 700 and 703 basement areas. OBG went to several places within the basements of these buildings, as depicted on **Figure 2B**, concentrating on fire doors and exterior doors. **Table 2** summarizes the micromanometer readings obtained as part of the study.

  Overall, on the basis of limited visual observations and data collected by OBG, the building appears to be negatively pressured with respect to ambient pressure. Air generally moves from the basement to the first floor, and is likely attributable to the ventilation equipment and process exhausts located on the first floor. That is, relative to the basement, air was largely observed to be drawn into the basement from exterior doors. The air was then observed to subsequently flow toward the interior fire doors within the basement and up to the first floor manufacturing areas. In this situation, air was being drawn up to the first floor from the basement due to higher intake sources within the area of manufacturing. Significant pressure differentials were observed in most testing locations, indicating adequate air movement.

2.1.3 Building 800

General building details concerning Building 800 include the following:

- Construction Date: 1943
- Square footage
  - Total: 1,463,980
  - Basement: 556,284
- Primary Use: GE payroll office, employee cafeteria, long-term storage areas, training areas (many unoccupied) and office areas (many unoccupied). A maintenance area for fork trucks is also located within the southeast corner of the basement.
- General Observations: Both an east-west trending hallway and a north-south trending hallway run beneath the building below grade. The north-south hallway, which measures between 15 and 20 feet wide, represents the approximate western edge of the basement, with the exception of the east-west hallway that extends all the way to the western building footprint. A tunnel connecting to Building 700 is located at the north end of the main north-south hallway. None of the areas within the basement of Building 800 appeared to be under construction or renovation during the reconnaissance conducted in 2015 and 2016. The first floor of Building 800 is primarily used for engine assembly. Columns within Building 800 run from west to east (from B through X) and from north to south (from 1 through 10).

During review of documents provided by GE, the following detailed information was provided for Building 800. **Figure 2C** presents a visual summary of this information:

- Slab Thickness and Condition: Varies between approximately 6-8 inches; piers at the base of columns can be as thick as 22 inches beginning at the base of the slab and can range from 3 feet to 10 feet in diameter. OBG observed no obvious large cracks (greater than 1-inch wide), areas of settling or exposed soils or subbase material within the basement areas. Only areas where the concrete was not covered by flooring or stored items were visually observed.
- Occupancy and Planned Renovations: During an OBG site visit conducted in late 2015 for Building 800, much of the space was accessible and was being used for storage of equipment, office furniture and other items. Some office areas were present, mainly along the northern hallway. However, access to these offices was restricted. Other areas were observed that appeared to be former, carpeted office settings, but had been transitioned into storage areas. A fork truck maintenance area was located in the southeastern portion of the basement. No renovations were observed within the basement of Building 800 during the 2015 and 2016 reconnaissance and none are reportedly planned for 2016.
- Chemical Inventory: OBG obtained information from the 2016 chemical inventory from GE personnel in the same manner described for the buildings above, focusing solely on CVOCs. In reviewing the information obtained for Building 800, trade products containing one or more of these chemicals were identified. However, each of these materials was identified as being located on the first floor and away from the basement areas, including the fork truck maintenance area.
- HVAC Systems: In communicating with GE personnel, the many HVAC units within Building 800 were too numerous to individually locate and evaluate. HVAC units within the basements of the building are reportedly supplied fresh air from air intakes at grade around the perimeter of the buildings. First floor and mezzanine areas are supplied fresh air from roof intakes.
- Flood Potential: The Flood Survey conducted in 2010 by CDM Smith concluded that portions of the Building 800 basement were flooded in 2001, but the flooding was attributed to run-off from the parking lot west of the building as well as a sump pump failure. High groundwater elevations were not cited within the area and pending the ongoing maintenance of the sump pumps, flooding should not occur within the basement.
- Utilities: According to utility plans, process and sanitary sewer lines are present below grade, mainly within the hallways of the basement. Other identified utilities include water, electric and oil separator lines, most of which fall outside of the perimeter of the basement. However, based on first floor manufacturing, it is likely these utilities are above-ground and run between the first-floor and the basement.
- Groundwater Data/Monitoring Wells: OBG reviewed the monitoring well database for the Facility and identified five wells along the north side of the building, each located to the south of Buildings 700 and 703. These same wells were described in Section 2.1.2 above and the two wells closest to the building contained total TCE Group concentrations between 171.7 and 197.5 µg/L. Four additional wells were identified to the south of Building 800. The two wells identified as being closest to the building, GM-9P and AF-23P, exhibited total concentrations of TCE Group compounds of 210 and 341.5 µg/L, respectively, when last sampled in December 1992 and December 2014, respectively.
- Differential Pressure Measurements: OBG utilized a digital micro-manometer and a smoke pen to monitor indoor air flow conditions and movement within the Building 800 basement area. OBG went to several places within the Building 800 basement, as depicted on **Figure 2C**, concentrating on fire doors and exterior doors. **Table 3** summarizes the micromanometer readings obtained as part of the study. Overall, the building was found to be negatively pressured, with air being drawn into the building. Within the building, air was observed to be drawn into the basement from both exterior doors and interior fire doors leading to the first floor. In this situation, the overall building, relative to the basement, was negatively pressured, with air from both ambient outdoor locations and the first floor being drawn into the basement. OBG did not observe obvious exhausts or effluents of air from the basement.

3. PROPOSED SAMPLING PLAN

Based on the site-specific building information discussed in Section 2.0 above, GE will be conducting an assessment to obtain sub-slab and indoor air soil vapor data to quantitatively evaluate the soil vapor pathway. GE is recommending that assessment activities be conducted in a phased approach, focusing first on the building that is believed to be most susceptible to soil vapor migration. This building, Building 800, represents the largest subgrade structure at the Facility, by square footage, as well as the building located nearest the highest groundwater concentrations of CVOCs at the Facility.

The active groundwater pump and treat system and its associated extraction wells are located closest to Building 800. In addition, recent data from groundwater monitoring wells exists both to the north and south of Building 800, which suggest that CVOCs may be located within groundwater beneath the footprint of the building. By evaluating the basement area, which is closest to groundwater, the Building 800 basement represents the "worst-case" scenario for the soil vapor pathway. Moreover, based on differential pressures and air flow demonstrations, the basement portion of the building is negatively pressured, with air from both ambient outdoor settings as well as the first floor being drawn into the basement.

The details regarding the proposed assessment activities for Building 800 are discussed below in the following subsections.

3.1 ASSESSMENT TASKS

GE proposes to install and sample seven (7) sub-slab soil vapor points as part of this investigation. Each of the sampling points will also have a co-located indoor air sample collected during the same time period. The seven locations will generally be spatially distributed across the footprint of the Building 800 basement. The sampling locations will include the locations of the 2006 event, so that a temporal comparison can be made. Proposed sampling locations are shown on **Figure 2C**.

3.1.1 Site Reconnaissance and Sub-Slab Soil Vapor Point Installation

OBG personnel will visit each proposed sampling location and coordinate the accessibility and security of the locations with GE prior to collecting the sample. GE and OBG will consider site-specific information, including accessibility, underground utilities and structural components, potential disruption to employees and safety in their decision-making process. Since the goal of this vapor assessment is to get a spatial distribution of data across the extent of the slab, the proposed locations may be modified to accommodate site constraints. Each location will be cleared of utilities during a separate mobilization by a private utility locating firm. Locating methods including electromagnetic (EM) resistivity and ground-penetrating radar (GPR) will be used to mark nearby utilities and other sub-grade structures. In addition, more detailed utility maps may be reviewed by the locating company. Final approved and cleared locations will be field-measured to nearby benchmarks (permanent wall and/or column locations).

3.1.2 Sub-Slab Soil Vapor Point Sampling

Once the proposed locations have been approved and cleared of utilities and other subgrade structures (if present), OBG personnel will revisit the site and install the sub-slab sampling points. When installing the points, a hammer drill equipped with a 3/8-inch diameter drill bit will be advanced through the slab and into the subbase/soil material beneath the slab. Slab thickness will be documented on field forms at this time. Once the drill bit has been advanced, the concrete dust will be swept up and the hole cleaned with a dry brush. ¼-inch outside diameter (O.D.) Teflon®-lined tubing will then be placed into the hole such that the tubing extends below the base of the concrete slab. Non-VOC permagum material will then be placed around the tubing and slightly into the annular space between the tubing and drill hole to provide for a seal. The end of the tubing will be capped with permagum and a cone placed over the sampling point in preparation for sampling. OBG will install each sampling point as part of a separate mobilization and then wait for a period of 1-2 days to allow for dust and/or potential sub-slab vapors to dissipate before performing the sampling.

Following the 1-2 day period, OBG will remobilize to the Building 800 basement sampling locations. At each location, a shroud will be placed over the tubing and sampling point and helium introduced into the shroud via separate tubing. Concurrent with the introduction of helium, the sampling tubing will be connected to a mechanical pump and Tedlar® bag. Once the helium is in the shroud, a battery-operated drill will be used to turn the pump and draw sub-slab vapors into the Tedlar® bag. Once the Tedlar® bag is filled, the tubing will be capped and the bag will be monitored with a helium detector. If helium is detected within the grab sample of sub-slab vapor above a level of 5% by volume, a breach in the seal of the tubing into the slab will be assumed and the installation process will be repeated until such time that a demonstration of adequate sealing can be made.

Once the sampling point and tubing have been demonstrated to be adequately sealed, the tubing will be connected to a laboratory-supplied batch-certified 6-liter Summa® canister using a brass compression fitting. Prior to connection, each of the canisters will be checked for vacuum pressure with a digital manometer and the pressures recorded. The shrouds will be left in place during sampling so as not to inadvertently disturb or affect the seal. Following successful connection to the Summa® canister, the regulator, which will be laboratory calibrated to sample for approximately 8 hours, will be opened, with the time of sample commencement recorded. Throughout the 8-hour sampling window, the analog vacuum gauge on the regulator will be monitored every 1-2 hours to check for vacuum levels and to demonstrate that sub-slab soil vapor is being introduced into the canister for analysis. During sampling, a sign will be placed in clear view that indicates that environmental sampling is occurring. A schematic of the sub-slab sampling point setup is provided as **Figure 3**. Photographs will be taken before and after sampling.

Following the 8-hour period, or at a time when between -3 and -5 millimeters of mercury (mm Hg) remain on the analog gauge, the canister will be closed and the sample collection will be complete. It is critical that at least between -3 and -5 mm Hg remain in the canister following sampling so that no air is required to be introduced to the sample by the laboratory as part of the extraction process. If the canister is allowed to be completely filled and no vacuum remains, supplied air will have to be introduced to the sample in order for the sample vapor to be extracted, which would cause the data to be compromised and likely flagged.

Once the sample collection process is complete, the tubing and shroud will be removed from each sampling point and the hole backfilled with either a concrete-colored Geocel™ caulking compound or with quick-drying hydraulic cement. Example field forms associated with the sub-slab soil vapor monitoring are located in **Appendix A**.

3.1.3 Indoor Air Sample Collection

Concurrent with the sub-slab sampling, co-located indoor air samples will also be collected at the same locations noted on **Figure 2C**. As part of the indoor air sample collection, laboratory-supplied, individually-certified 6-liter Summa™ canisters will be placed proximate to the sub-slab sampling locations. The canisters will be equipped with 8-hour sampling regulators, similar to the sub-slab canisters. The canisters will be gauged for vacuum pressures using a digital manometer and recorded prior to opening the canister. Consistent with sampling guidance, the canister will be set on buckets, chairs or other devices such that the air intake is located within the "breathing zone," between 3 and 5 feet above the slab. Moreover, the indoor air samples will be collected in open-air environments, such that the sample would not represent an anomalous result (*e.g.*, within a closet or mechanical room). Similar to the sub-slab sampling procedures identified above, vacuum pressures will be checked throughout the sampling process.

In addition, as part of the indoor air sampling process, OBG will generate a chemical inventory list of items that are present in the vicinity of the sampling locations. As part of the inventory, chemical trade names will be documented, as well as the CAS numbers (if readily apparent) and amount of each material. Safety Data Sheets (SDSs) will be requested from GE for review, if necessary. Example field forms, including the chemical inventory forms, associated with the indoor air sample collection are located in **Appendix A**.

3.1.4 Outdoor (Ambient) Air Sample Collection

Outdoor ambient air samples will also be collected as part of the assessment process at locations denoted on **Figure 2C**. Laboratory-supplied, individually-certified 6-liter Summa™ canisters will be placed in both upwind and downwind locations relative to the building, preferably near basement air intakes associated with the Building 800 HVAC systems. The canisters will be equipped with 8-hour sampling regulators, similar to the sub-slab and indoor air canisters. The canisters will be gauged for vacuum pressures using a digital manometer and recorded prior to opening the canisters. Consistent with sampling guidance, the canisters will be set on buckets, chairs or other devices such that the air intake on the canister is located within the "breathing zone," between 3 and 5 feet above the ground surface. Vacuum pressures will be checked throughout the sampling process. Should the sampling event occur on a day with precipitation, the canister will be equipped with a funnel and tubing to prevent moisture from inadvertently entering the canister. Example field forms associated with the outdoor air sample collection are located in **Appendix A**.

3.2 LABORATORY ANALYSIS AND DATA QA/QC

Samples will be shipped to Eurofins Lancaster Laboratories Environmental (ELLE) in Lancaster, Pennsylvania following each sampling event. Samples will be analyzed for the CVOC list specified below by USEPA Method TO-15. Deliverables from the laboratory will include an EQuIS 4-file electronic data deliverable (EDD) and a Level IV, Contract Laboratory Program (CLP)-like data report, which would allow for data validation in the future, if warranted or requested by USEPA. Turnaround time from the laboratory is anticipated to be 15 business days from sample receipt.

The analyzed samples will include the following compounds:

- TCE
- PCE
- Carbon tetrachloride
- Chloroethane
- 1,1-DCA
- 1,2-DCA
- 1,1-DCE
- *cis*-1,2-DCE
- *trans*-1,2-DCE
- 1,1,1-TCA
- VC

Due to the type of sampling being conducted, duplicate samples will not be collected as part of this event. Outdoor ambient samples will serve as both a means of comparison to indoor air sampling results as well as a form of a field or equipment blank. As mentioned previously, the canisters that will be used to analyze the indoor and outdoor air samples will be individually-certified by the laboratory. Individual certification forms will be provided by the laboratory and can be provided as requested, if data validation is warranted. Sub-slab soil vapor data will utilize batch-certified canisters, which requires that a certain percentage of the canisters, selected at random, go through the certification process. As part of this process, laboratory reporting limits for the compounds from batch-certified canisters are not as low as for individually-certified canisters. However, the limits of the batch-certified canisters will still meet applicable screening levels for sub-slab soil vapor, which are higher than those screening levels for indoor air.

3.3 DATA EVALUATION AND SCREENING

Following the receipt of laboratory data, OBG will evaluate the data and compare them to established USEPA VI screening levels for the industrial land use pathway. The screening levels for TCE and PCE were previously established within the 2015 Interim CMS Report for soil vapor. However, upon review of the 2015 Interim Report for soil vapor, USEPA requested modified industrial screening levels that are based on a target hazard quotient of 1. The new screening levels identified specifically for sub-slab and indoor air for TCE and PCE are identified as the following:

Soil Vapor Screening Levels (µg/m^3)	
Parameter	**Industrial**
Tetrachloroethene (PCE)	5,600
Trichloroethene (TCE)	280
Indoor Air Screening Levels (µg/m^3)	
Parameter	**Industrial**
Tetrachloroethene (PCE)	168
Trichloroethene (TCE)	8.4

3.4 SUBSEQUENT SUB-SLAB SOIL VAPOR, INDOOR AND OUTDOOR AIR MONITORING

In order to account for seasonal variability, GE proposes to collect two rounds of sub-slab and indoor air data, one during the winter months (December through March) and one during the summer months (June through September). Based on USEPA guidance documents and OBG's experience with vapor migration, seasonal fluctuations in temperature, groundwater levels, building HVAC system operations and other factors can each influence sub-slab soil vapor and indoor air behaviors and subsequently, their concentrations. Therefore, by collecting two events at different times of the year, the soil vapor pathway can be better understood.

Based on the results, GE can also make both a quantitative and qualitative recommendation for the further evaluation of the VI pathway beneath Buildings 500 and 700/703, if required.

3.5 REPORTING

A standalone letter report will be generated following the first event, which is scheduled for March 2016. The letter report will include a summary of assessment activities and will compare analytical data to the existing sub-slab and indoor air screening criteria. The report will be provided as a deliverable to USEPA for review. The purpose of the review would be to provide feedback to GE prior to the second event.

4. REFERENCES

O'Brien & Gere, 2007. *Vapor Intrusion Investigation Report*, GE Evendale Site, Evendale Ohio. April 2007.

O'Brien & Gere, 2015. *Corrective Measures Study Interim Report – Soil Vapor*, GE Aviation, Evendale, Ohio. May 2015.

U.S. Environmental Protection Agency, 2012. *Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings.* EPA 530-R-10-002. March 2012.

Table 1 - Differential Pressure Field Measurements and Notes

Building 500			
Location ID	**Location Description**	**Micromanometer Reading**	**Smoke Pen Description**
1	Exterior Door to Basement Stairs (at grade); West side of 500	-0.025	Smoke movement; drawn into stairwell leading to basement
2	Interior doors at base of exterior stairs; West side of 800	0.002	No significant air movement
3	Interior doors leading to stairway to first floor manufacturing area (southwestern hallway)	0.022	Smoke drawn up to first floor from basement area
4	Interior doors leading to stairway to first floor manufacturing area (west central hallway)	0.015	Smoke drawn up to first floor from basement area
5	Interior doors leading to stairway to first floor manufacturing area (northwest corner)	0.018	Smoke drawn up to first floor from basement area
6	Interior doorway leading from hallway to north end of basement	-0.010	Smoke drawn into basement hallway from north end of basement
7	Interior doors leading to stairway to first floor manufacturing area (east central access)	0.000	No movement of smoke
8	Interior doorway leading to Building 500/510 tunnel heading east	+0.037	Smoke drawn out of basement and into tunnel/hallway
9	Interior doors leading to stairway to first floor manufacturing area (southeast corner)	0.016	Smoke drawn up to first floor from basement area
10	Interior doors at base of East stairs leading to first floor exterior doors	0.007	Smoke drawn from basement into stairwell
11	Exterior Door to Basement Stairs (at grade); East side of 500	0.010	Smoke drawn out of stairwell toward the outside
12	Exterior door along north side of 500; stairs to basement approximately 30 feet south	-0.017	Smoke drawn into the building
13	Interior doors leading to stairway to first floor manufacturing area (southwest corner)	-0.011	Smoke drawn into basement from first floor (when door open)
14	Exterior Door to Basement Stairs (at grade); South side of 500	-0.015	Smoke drawn into stairwell area toward basement

Table 2 - Differential Pressure Field Measurements and Notes

Building 700/703			
Location ID	**Location Description**	**Micromanometer Reading**	**Smoke Pen Description**
1	Exterior Door to Basement Stairs (at grade); South side of 700	-0.009	Slight smoke movement; drawn into basement
2	Interior doors at base of exterior stairs; South side of 700	-0.068	Smoke drawn into basement hallway
3	Interior doors leading to stairway to first floor manufacturing area (south hallway)	0.021	Smoke drawn to first floor from basement (when door open)
4	Interior doorway leading to office area (south hallway)	-0.005	Minor to no movement of smoke
5	Interior doors leading to stairway to first floor manufacturing area (south hallway)	0.018	Smoke drawn to first floor from basement (when door open)
6	Interior doors leading to stairway to first floor manufacturing area (east central hallway)	0.021	Smoke drawn to first floor from basement (when door open)
7	Interior door between storage area and hallway	0.000	No movement
8	Interior doors leading to stairway to first floor manufacturing area (east hallway)	0.020	Smoke drawn to first floor from basement (when door open)
9	Interior Doorway from 703 basement hallway to Engine Testing/Storage Area	-0.010	Smoke drawn into basement hallway
10	Access point for pedestrian and golf cart traffic (east end of Building 703; at grade)	-0.013	Smoke drawn into basement hallway
11	Interior doors leading to stairway to first floor 703 test cell area (east hallway at division between 700 & 703)	0.021	Smoke drawn to first floor from basement (when door open)
12	Interior doors leading to stairway to first floor manufacturing area (north hallway)	0.018	Smoke drawn to first floor from basement (when door open)
13	Exterior Door to Basement Stairs (at grade); North side of 700	0.006	Smoke drawn slightly to outside
14	Interior doors leading to stairway to first floor manufacturing area (north hallway)	0.021	Smoke drawn to first floor from basement (when door open)
15	Interior doors leading to stairway to first floor manufacturing area (west hallway)	0.017	Smoke drawn to first floor from basement (when door open)
16	Interior door leading to "Building 700 Classrooms" (west hallway)	-0.002	Negligible movement

Table 2 - Differential Pressure Field Measurements and Notes

Building 700/703			
Location ID	**Location Description**	**Micromanometer Reading**	**Smoke Pen Description**
17	Interior doors leading to stairway to first floor manufacturing area (furthest west access door)	0.017	Smoke drawn to first floor from basement (when door open)
18	Exterior Door to Basement Stairs (at grade); West side of 700	-0.031	Smoke drawn into basement stairs area leading to basement

Table 3 - Differential Pressure Field Measurements and Notes

Building 800			
Location ID	Location Description	Micromanometer Reading	Smoke Pen Description
1	Interior doors at base of exterior stairs; West side of 800	-0.005	Slight smoke movement; drawn into basement
2	Exterior Door to Basement Stairs (at grade); West side of 800	-0.009	Smoke drawn into basement hallway
3	Interior doors at base of exterior stairs; South side of 800	-0.009	Smoke drawn into basement hallway
4	Exterior Door to Basement Stairs (at grade); South side of 800	-0.047	Smoke drawn into basement stairs area; significant movement
5	Interior doors leading to stairway to first floor manufacturing area (south hallway)	-0.027	Smoke drawn into basement from first floor (when door open)
6	Interior doors leading to stairway to first floor manufacturing area (central access; south of main hallway)	-0.028	Smoke drawn into basement from first floor (when door open)
7	Interior door between storage area and main hallway	0.000	No movement
8	Exterior door at base of loading ramp (southeast side of 800)	-0.028	Smoke drawn into basement from exterior (when door open)
9	Exterior door at base of stairs (east side of 800)	0.028	Smoke drawn towards outside; high movement of air, door propped open
10	Interior doors leading to exit stairway to exterior (northeast side of 800)	-0.027	Smoke drawn into basement
11	Exterior Door to Basement Stairs (at grade); Northeast side of 800	-0.031	Smoke drawn into stairway area toward basement (when door open)
12	Interior doorway separating former office area from storage	0.000	No air movement
13	Interior doors leading to stairway to first floor manufacturing area (central access; north of main hallway)	-0.039	Smoke drawn into basement from first floor (when door open)
14	Interior doorway separating "Tool Design" area from basement north hallway	-0.028	Smoke drawn to office area from basement hallway (when door open)
15	Interior doors leading to stairway to first floor manufacturing area (north hallway just before tunnel connecting 700 & 800)	-0.045	Smoke drawn to basement from first floor (when door open)

DRAFT

FIGURE 1

I:\Ge-Cep.612\STDS\GIS\Soil Vapor Pathway - Pre Assessment Survey\000 - Figure 1 - Site Location Map.mxd

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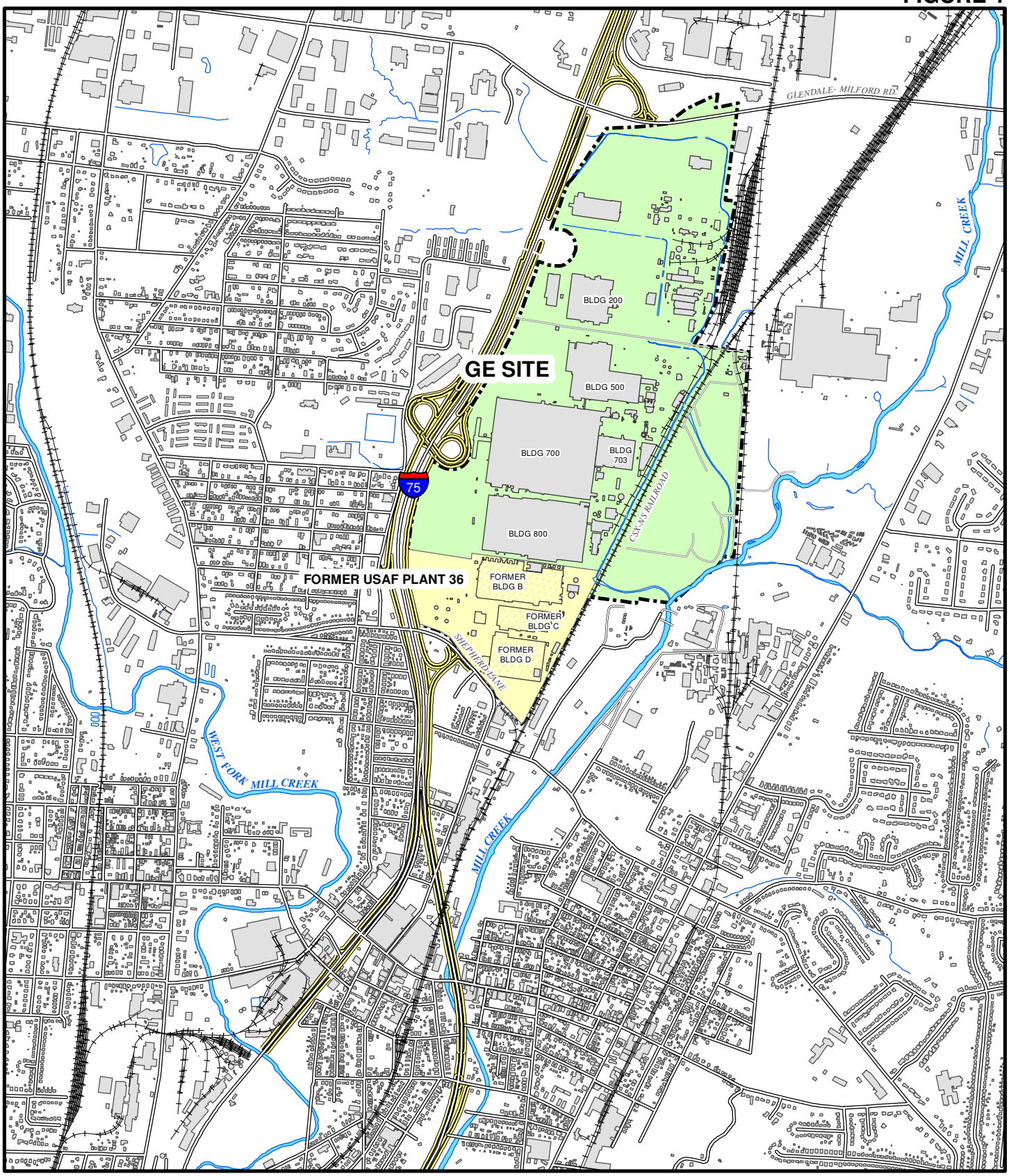


FACILITY SOIL VAPOR WORK PLAN
GE EVENDALE, OHIO

SITE LOCATION MAP

N

0 800 1,600 3,200
Feet

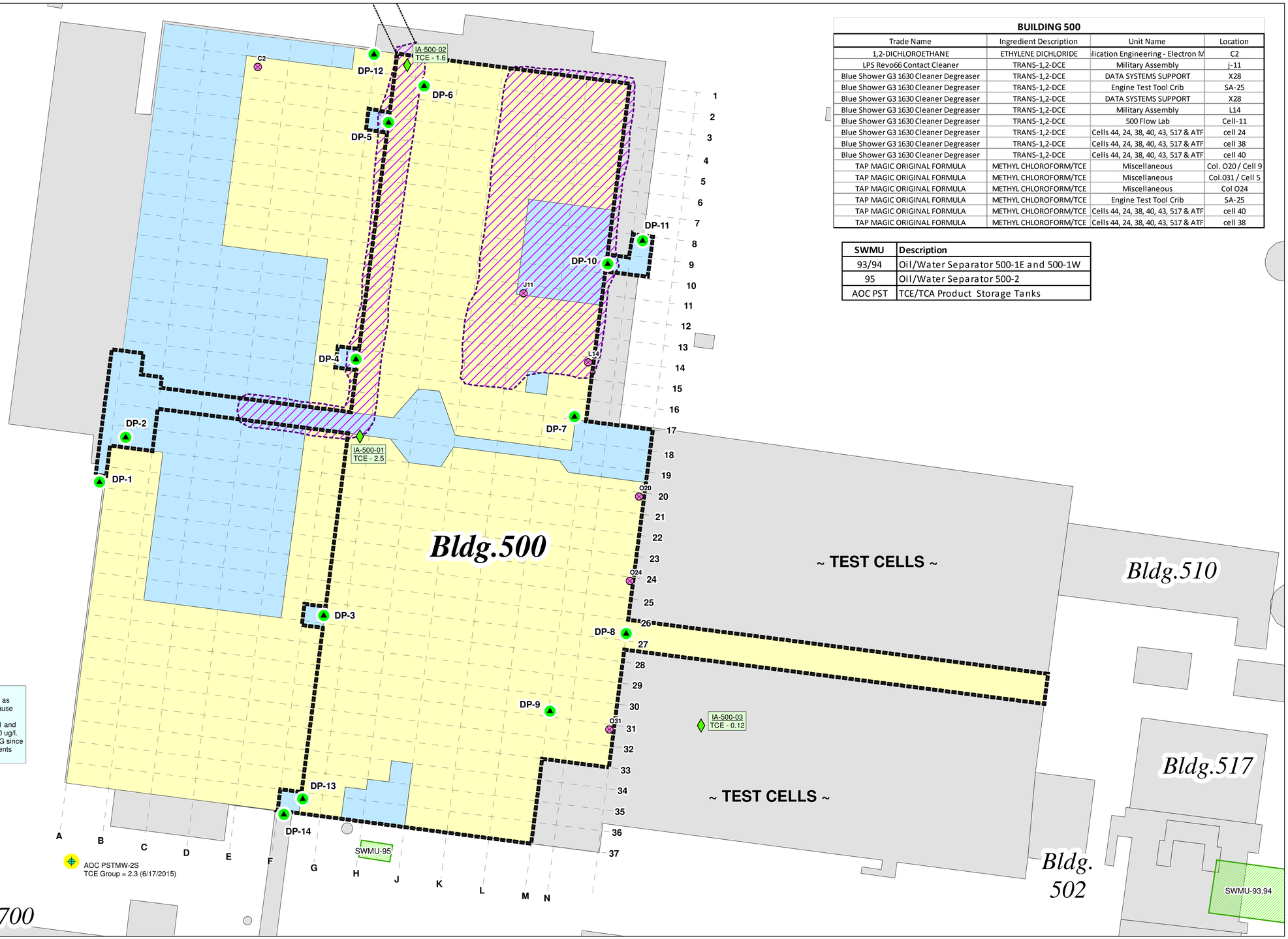
O'BRIEN & GERE ENGINEERS, INC.

612/62577/001
MARCH 2016

PLOTDATE: 02/22/16 2:45:15 PM ONeilUM

Monitoring Wells Notes:
1 - This drawing was developed in color. Reproduction in black and white may not represent the data as intended.
2 - TCE Group concentrations are in µg/l (ppb).
3 - The TCE Group includes TCE, PCE, Vinyl Chloride, cis-1,2-DCE, and trans-1,2-DCE,
4 - 'ND' denotes Not Detected.

Air Sample Notes:
1 - Analytical results are presented in µg/m3 - micrograms per cubic meter.
2 - Samples were collected in December 2006.
3 - lindoor air samples were collected using SUMMA® canisters.



AOC PSTMW-1SR Notes:
1 - Monitoring well AOC PSTMW-1SR was installed in 2012 as a replacement for monitoring well AOC PSTMW-1S because AOC PSTMW-1S could not be located.
2 - AOC PSTMW-1S was last sampled in December of 2001 and the TCE Group concentration total at that time was 1,570 ug/l.
3 - AOC PSTMW-1SR has been sampled nine times by OBG since it was installed and has been non-detect for the constituents of concern at the site each time.

BUILDING 500

Trade Name	Ingredient Description	Unit Name	Location
1,2-DICHLOROETHANE	ETHYLENE DICHLORIDE	lication Engineering - Electron M	C2
LPS Revo66 Contact Cleaner	TRANS-1,2-DCE	Military Assembly	j-11
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	DATA SYSTEMS SUPPORT	X28
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Engine Test Tool Crib	SA-25
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	DATA SYSTEMS SUPPORT	X28
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Military Assembly	L14
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	500 Flow Lab	Cell-11
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Cells 44, 24, 38, 40, 43, 517 & ATF	cell 24
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Cells 44, 24, 38, 40, 43, 517 & ATF	cell 38
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Cells 44, 24, 38, 40, 43, 517 & ATF	cell 40
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Miscellaneous	Col. O20 / Cell 9
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Miscellaneous	Col.031 / Cell 5
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Miscellaneous	Col O24
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Engine Test Tool Crib	SA-25
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Cells 44, 24, 38, 40, 43, 517 & ATF	cell 40
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Cells 44, 24, 38, 40, 43, 517 & ATF	cell 38

SWMU	Description
93/94	Oil/Water Separator 500-1E and 500-1W
95	Oil/Water Separator 500-2
AOC PST	TCE/TCA Product Storage Tanks

LEGEND

- BASEMENT EXTENT
- ACCESSIBLE AREA
- INACCESSIBLE AREA
- FLOOD AREA
- BUILDINGS
- SWMU/AOC
- PERCHED ZONE MONITORING WELL
- CHEMICAL INVENTORY LOCATION
- INDOOR AIR SAMPLE LOCATION (2006)
- DIFFERENTIAL PRESSURE LOCATION
- COLUMN LINES (COLUMNS AT INTERSECTIONS)

TCE GROUP CONCENTRATION KEY
- NOT DETECTED OR NOT SAMPLED
- DETECTED BUT LESS THAN 10 ug/l
- GREATER THAN 10 ug/L; LESS THAN 100 ug/L
- GREATER THAN 100 ug/L

FACILITY SOIL VAPOR WORK PLAN
GE EVENDALE, OHIO

BUILDING 500

0 50 100 200
Feet

BUILDING NOTES:
1 - SLAB THICKNESS IN BUILDING 500 VARIES BETWEEN 8 AND 10 INCHES.
2 - PIERS AT THE BASE OF THE COLUMNS CAN BE AS THICK AS 22 INCHES.
3 - PIERS VARY IN AREA FROM 3 FOOT SQUARE TO 10 FOOT SQUARE (DEPENDENT ON PIER THICKNESS).
4 - ACCORDING TO A FLOOD STUDY CONDUCTED BY CDM SMITH IN 2010, BUILDING 500 BASEMENT IS SUSCEPTIBLE TO FLOODING DUE TO HIGH GROUNDWATER.

N

GE-CEP/STDS/002
MARCH 2016

O'BRIEN & GERE ENGINEERS, INC.

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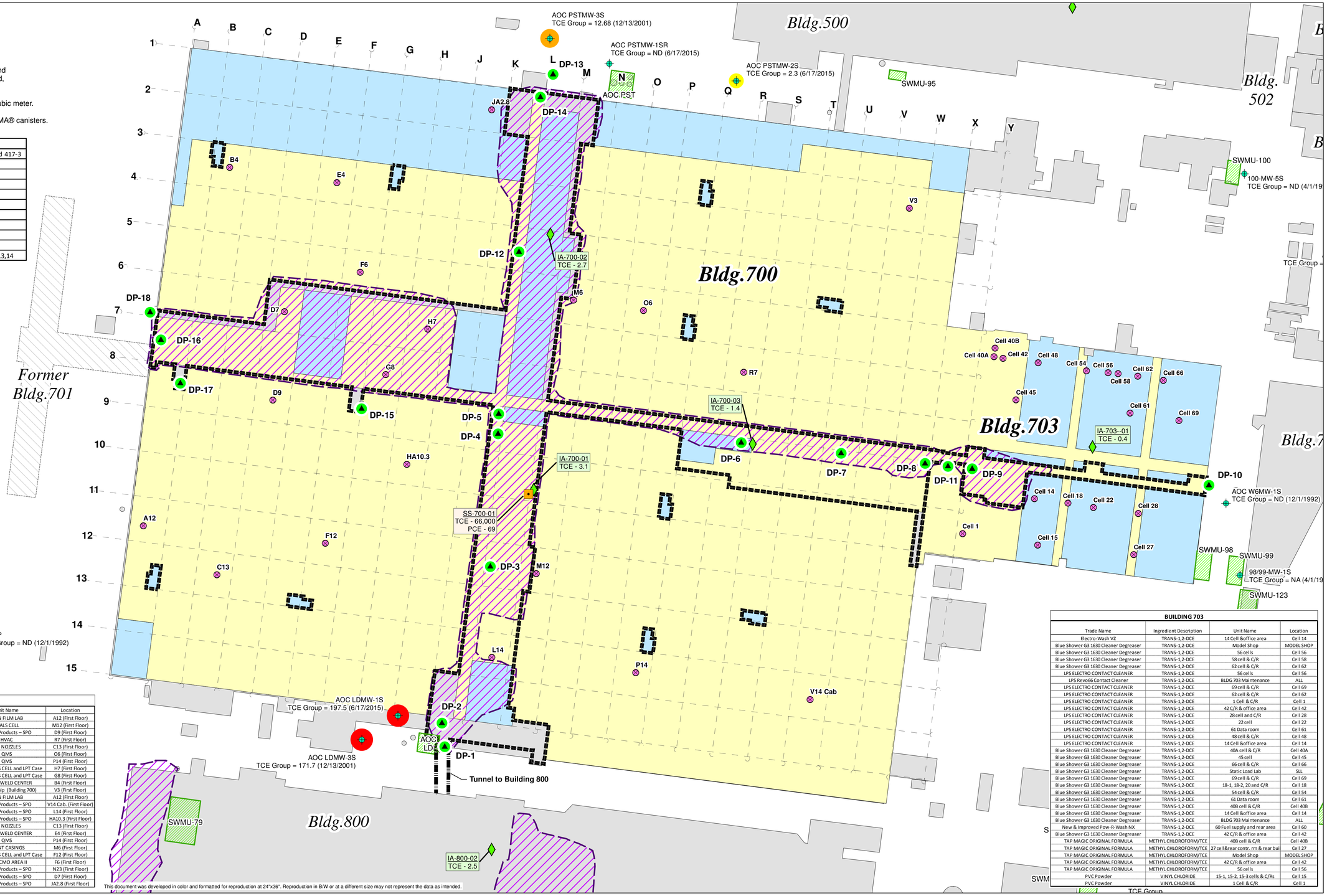
I:\Ge-Cep.6126\STDS\GIS\Soil Vapor Pathway - Pre Assessment Survey\006 - Building 700 - Prelim Assess - Smp Plan.mxd

Monitoring Wells Notes:
1 - This drawing was developed in color. Reproduction in black and white may not represent the data as intended.
2 - TCE Group concentrations are in µg/l (ppb).
3 - The TCE Group includes TCE, PCE, Vinyl Chloride, cis-1,2-DCE, and trans-1,2-DCE,
4 - 'ND' denotes Not Detected.
5 - 'NA' denotes Not Analyzed. Monitoring wells 98/99 MW-1S and AOC W4MW-1S were sampled one time on the date indicated,

Air Sample Notes:
1 - Analytical results are presented in µg/m3 - micrograms per cubic meter.
2 - Samples were collected in December 2006.
3 - Soil vapor and indoor air samples were collected using SUMMA® canisters.

SWMU	Description
62/63	Underground Waste Oil/FuelEl Storage Tank 417-2 and 417-3
79	Former Bldg. 800 Wastewater Pretreatment System
93/94	Oil/Water Separator 500-1E and 500-1W
95	Oil/Water Separator 500-2
98/99	Oil/Water Separator 703-1E and 703-1W
100	Oil/Water Separator 707-1
122	Stormwater Pumphouse 422
123	Stormwater Pumphouse 423
AOC LD	Bldg. 700 South Loading Dock
AOC PST	TCE/TCA Product Storage Tanks
AOC W-4	Inactive Underground Product Storage Tanks 507-5,6,13,14



BUILDING 700

Trade Name	Ingredient Description	Unit Name	Location
Vacseal	PERCHLOROETHYLENE	THIN FILM LAB	A12 (First Floor)
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	SEALS CELL	M12 (First Floor)
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Special Products – SPO	D9 (First Floor)
New & Improved Pow-R-Wash NX	TRANS-1,2-DCE	HVAC	R7 (First Floor)
New & Improved ElectroWash NX Liquid	TRANS-1,2-DCE	IPE NOZZLES	C13 (First Floor)
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	QMS	O6 (First Floor)
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	QMS	P14 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	LARGE PARTS CELL and LPT Case	H7 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	LARGE PARTS CELL and LPT Case	G8 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	TMF/EB WELD CENTER	B4 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Prep To Ship (Building 700)	V3 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	THIN FILM LAB	A12 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Special Products – SPO	V14 Cab. (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Special Products – SPO	L14 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Special Products – SPO	HA10.3 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	IPE NOZZLES	C13 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	TMF/EB WELD CENTER	E4 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	QMS	P14 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	FRONT CASINGS	M6 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	LARGE PARTS CELL and LPT Case	F12 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	EMO/CMO AREA II	F6 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Special Products – SPO	N23 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Special Products – SPO	D7 (First Floor)
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Special Products – SPO	JA2.8 (First Floor)

BUILDING 703

Trade Name	Ingredient Description	Unit Name	Location
Electro-Wash VZ	TRANS-1,2-DCE	14 Cell &office area	Cell 14
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Model Shop	MODEL SHOP
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	56 cells	Cell 56
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	58 cell & C/R	Cell 58
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	62 cell & C/R	Cell 62
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	56 cells	Cell 56
LPS Revo66 Contact Cleaner	TRANS-1,2-DCE	BLDG 703 Maintenance	ALL
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	69 cell & C/R	Cell 69
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	62 cell & C/R	Cell 62
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	1 Cell & C/R	Cell 1
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	42 C/R & office area	Cell 42
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	28 cell and C/R	Cell 28
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	22 cell	Cell 22
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	61 Data room	Cell 61
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	48 cell & C/R	Cell 48
LPS ELECTRO CONTACT CLEANER	TRANS-1,2-DCE	14 Cell &office area	Cell 14
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	40A cell & C/R	Cell 40A
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	45 cell	Cell 45
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	66 cell & C/R	Cell 66
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	Static Load Lab	SLL
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	69 cell & C/R	Cell 69
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	18-1, 18-2, 20 and C/R	Cell 18
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	54 cell & C/R	Cell 54
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	61 Data room	Cell 61
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	40B cell & C/R	Cell 40B
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	14 Cell &office area	Cell 14
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	BLDG 703 Maintenance	ALL
New & Improved Pow-R-Wash NX	TRANS-1,2-DCE	60 Fuel supply and rear area	Cell 60
Blue Shower G3 1630 Cleaner Degreaser	TRANS-1,2-DCE	42 C/R & office area	Cell 42
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	40B cell & C/R	Cell 40B
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	27 cell&rear contr. rm & rear bui	Cell 27
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	Model Shop	MODEL SHOP
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	42 C/R & office area	Cell 42
TAP MAGIC ORIGINAL FORMULA	METHYL CHLOROFORM/TCE	56 cells	Cell 56
PVC Powder	VINYL CHLORIDE	15-1, 15-2, 15-3 cells & C/Rs	Cell 15
PVC Powder	VINYL CHLORIDE	1 Cell & C/R	Cell 1

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LEGEND

- BASEMENT EXTENT
- ACCESSIBLE AREA
- INACCESSIBLE AREA
- FLOOD AREA
- BUILDINGS
- FORMER BUILDING
- PERCHED ZONE MONITORING WELL
- CHEMICAL INVENTORY LOCATION
- INDOOR AIR SAMPLE LOCATION (2006)
- SUBSLAB AIR SAMPLE LOCATION (2006)
- DIFFERENTIAL PRESSURE LOCATION
- COLUMN LINES (COLUMNS AT INTERSECTIONS)
- SWMU/AOC

TCE GROUP CONCENTRATION KEY

- NOT DETECTED OR NOT SAMPLED
- DETECTED BUT LESS THAN 10 ug/l
- GREATER THAN 10 ug/L; LESS THAN 100 ug/L
- GREATER THAN 100 ug/L

FACILITY SOIL VAPOR WORK PLAN
GE EVENDALE, OHIO

BUILDING 700 AND 703

0 100 200 400
Feet

BUILDING NOTES:
1 - SLAB THICKNESS IN BUILDING 700 IS TYPICALLY 6 INCHES.
2 - SLAB THICKNESS IN BUILDING 703 VARIES BETWEEN 6 AND 10 INCHES.
3 - PIERS AT THE BASE OF THE COLUMNS CAN BE AS THICK AS 22 INCHES.
4 - PIERS VARY IN AREA FROM 3 FOOT SQUARE TO 10 FOOT SQUARE (DEPENDENT ON PIER THICKNESS).
5 - ACCORDING TO FLOOD STUDY CONDUCTED BY CDM SMITH IN 2010, BUILDING 700/703 BASEMENTS FLOODED IN 2001 DUE TO LOW-LYING ROADWAY BETWEEN THE FORMER BUILDING 701 AND BUILDING 700. FLOODING WAS ALSO A RESULT OF AN INADEQUATE SUMP PUMP. HIGH GROUNDWATER WAS NOT REFERENCED AS A CONTRIBUTING FACTOR TO FLOODING.

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GE-CEP/STDS/002
MARCH 2016

O'BRIEN & GERE ENGINEERS, INC.

PLOTDATE: 02/22/16 2:49:32 PM ONeilUM

I:\Ge-Cep\612\STDS\GIS\Soil Vapor Pathway - Pre Assessment Survey\007 - Building 800 - Prelim Assess - Smp Plan.mxd

Monitoring Well Notes:
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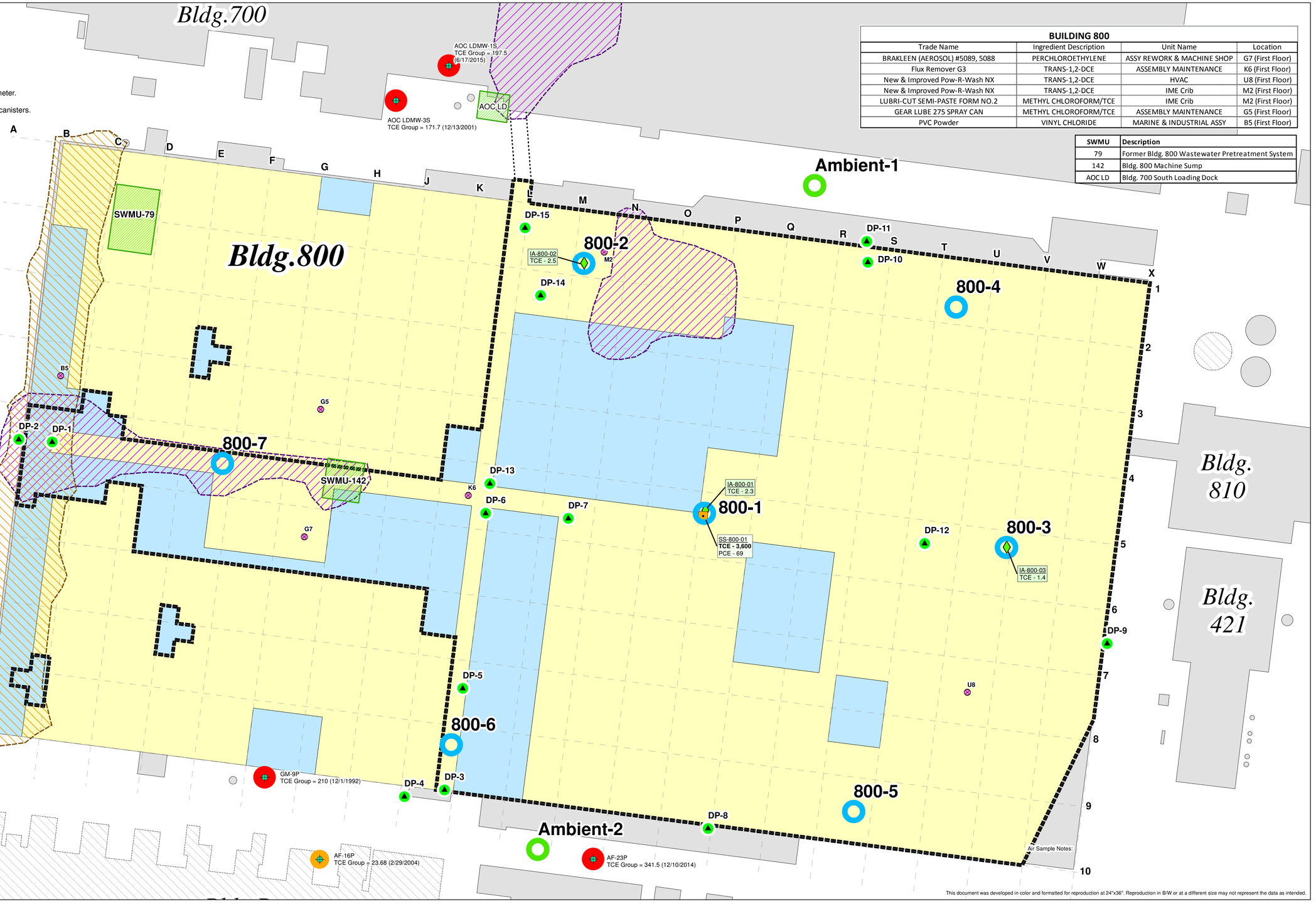
2 - TCE Group concentrations are in µg/l (ppb).
3 - The TCE Group includes TCE, PCE, Vinyl Chloride, cis-1,2-DCE, and trans-1,2-DCE,
4 - 'ND' denotes Not Detected.

Air Sample Notes:
1 - Analytical results are presented in µg/m3 - micrograms per cubic meter.
2 - Samples were collected in December 2006.
3 - Soil vapor and indoor air samples were collected using SUMMA® canisters.

BUILDING 800

Trade Name	Ingredient Description	Unit Name	Location
BRAKLEEN (AEROSOL) #5089, 5088	PERCHLOROETHYLENE	ASSY REWORK & MACHINE SHOP	G7 (First Floor)
Flux Remover G3	TRANS-1,2-DCE	ASSEMBLY MAINTENANCE	K6 (First Floor)
New & Improved Pow-R-Wash NX	TRANS-1,2-DCE	HVAC	U8 (First Floor)
New & Improved Pow-R-Wash NX	TRANS-1,2-DCE	IME Crib	M2 (First Floor)
LUBRI-CUT SEMI-PASTE FORM NO.2	METHYL CHLOROFORM/TCE	IME Crib	M2 (First Floor)
GEAR LUBE 275 SPRAY CAN	METHYL CHLOROFORM/TCE	ASSEMBLY MAINTENANCE	G5 (First Floor)
PVC Powder	VINYL CHLORIDE	MARINE & INDUSTRIAL ASSY	B5 (First Floor)

SWMU	Description
79	Former Bldg. 800 Wastewater Pretreatment System
142	Bldg. 800 Machine Sump
AOC LD	Bldg. 700 South Loading Dock



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LEGEND

- BASEMENT EXTENT
- BUILDINGS
- INACCESSIBLE AREA
- ACCESSIBLE AREA
- BASEMENT FLOOD AREA
- FIRST FLOOR FLOOD AREA
- PERCHED ZONE MONITORING WELL
- CHEMICAL INVENTORY LOCATION
- INDOOR AIR SAMPLE LOCATION (2006)
- SUBSLAB AIR SAMPLE LOCATION (2006)
- DIFFERENTIAL PRESSURE LOCATION
- PROPOSED INDOOR AIR AND SUBSLAB SAMPLE LOCATIONS
- PROPOSED AMBIENT SAMPLE LOCATIONS
- COLUMN LINES (COLUMNS AT INTERSECTIONS)
- SWMU/AOC

TCE GROUP CONCENTRATION KEY
- NOT DETECTED OR NOT SAMPLED
- DETECTED BUT LESS THAN 10 ug/l
- GREATER THAN 10 ug/L; LESS THAN 100 ug/L
- GREATER THAN 100 ug/L

FACILITY SOIL VAPOR WORK PLAN
GE EVENDALE, OHIO

BUILDING 800

0 50 100 200
Feet

BUILDING NOTES:
1 - SLAB THICKNESS IN BUILDING 800 VARIES BETWEEN 6 AND 8 INCHES.
2 - PIERS AT THE BASE OF THE COLUMNS CAN BE AS THICK AS 22 INCHES.
3 - PIERS VARY IN AREA FROM 3 FOOT SQUARE TO 10 FOOT SQUARE (DEPENDENT ON PIER THICKNESS).
4 - ACCORDING TO A FLOOD STUDY CONDUCTED BY CDM SMITH IN 2010, BUILDING 800 BASEMENT FLOODED IN 2001 DUE TO RUNOFF FROM AN ADJACENT PARKING LOT AS WELL AS AN OFFLINE LEAD UMP. ADDITIONAL GARAGE RAMP FLOODING OCCURRED DUE TO INADEQUATE PUMPS. HIGH GROUNDWATER WAS NOT REFERENCED AS A CONTRIBUTING FACTOR TO FLOODING."

N

GE-CEP/STDS/002
MARCH 2016

O'BRIEN & GERE ENGINEERS, INC.

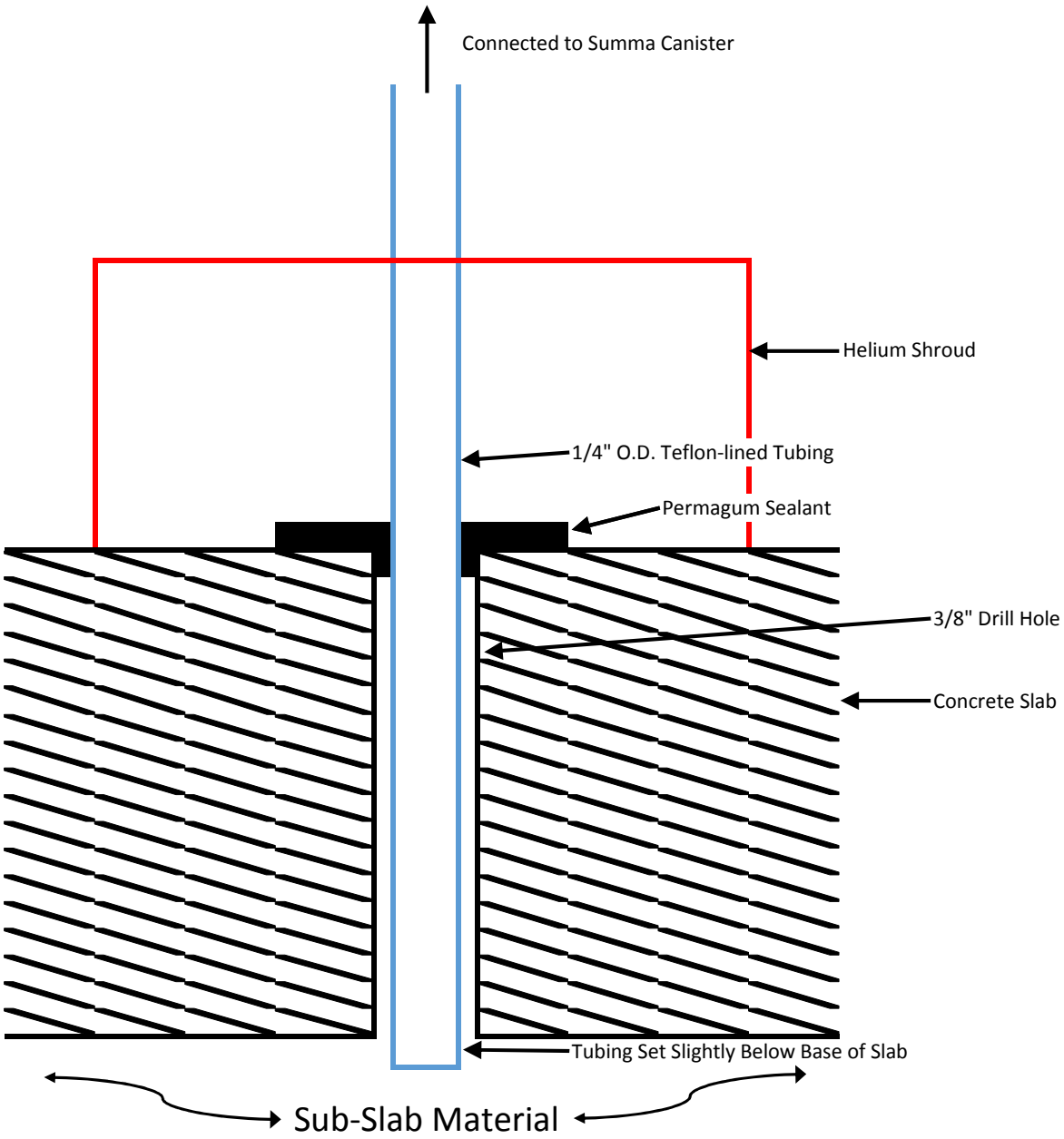

Figure 3. Example Sub-Slab Soil Vapor Sampling Point Setup.

Field Forms

O'BRIEN & GERE

Multiple Vapor Intrusion Sampling Form

Project # _____ Date _____

Project Name _____ Collector _____

Structure Location

_____

PID/FID meter ID _____

Sample Duration (Intended) _____

Sample Locations

_____

_____

_____

Indoor Air Sample	Sub-structure Sample	Circle Sample Type: Indoor Air SS-DUP Ambient IA-DUP
Sample ID _____	Sample ID _____	Sample ID _____
Canister ID _____	Canister ID _____	Canister ID _____
Flow Controller ID _____	Flow Controller ID _____	Flow Controller ID _____
Date/Time start _____	Date/Time start _____	Date/Time start _____
Date/Time end _____	Date/Time end _____	Date/Time end _____
Gauge prior to start _____	Gauge prior to start _____	Gauge prior to start _____
Start pressure _____	Start pressure _____	Start pressure _____
End pressure _____	End pressure _____	End pressure _____
Complete all that apply:	Complete all that apply:	Complete all that apply:
Air temperature (°F) _____	Air temperature (°F) _____	Air temperature (°F) _____
PID/FID reading _____	PID/FID reading _____	PID/FID reading _____
in. tubing used _____	in. tubing used _____	in. tubing used _____
Tubing purged? _____	Tubing purged? _____	Tubing purged? _____
	Chamber tracer gas concentration: _____	
	Tracer gas concentration during purging: _____	
For indoor location:	For indoor location:	For outdoor location:
Noticeable odor _____	Noticeable odor _____	Noticeable odor _____
Intake height above floor (in) _____	Floor slab depth _____	Distance to road (ft) _____
Floor surface type _____	Intake depth below floor (in) _____	Direction to closest building (degrees) _____
Room _____	Floor surface type _____	Distance to closest building (ft) _____
Story/level _____	Room _____	Intake height above ground level (in) _____
_____	Story/level _____	_____

Building Survey and Chemical Inventory Form Completed? _____

Photographs Taken? _____

Comments: _____

_____

_____

Analytical method required _____

Laboratory used _____

O'BRIEN & GERE

Indoor Air Quality Building Survey

Date:
Collector:
Affiliation: O'Brien & Gere

Access Contact: _____ Address: _____
Phone: _____ _____
Best time to contact: _____ Tax ID: _____

Owner ☐ Renter ☐ Other ☐ Access Agreement Signed?: _____

Date built _____ Building type:
Yrs. of residence _____ Residential ☐ School ☐ Industrial ☐
No. of occupants _____ Commercial ☐ Church ☐ Other _____

Check all that apply:

Ranch ☐ Raised Ranch ☐ 2-Family ☐ Apartments ☐
Cape ☐ Colonial ☐ Duplex ☐ Condominium ☐
3-Family ☐ Mobile Home ☐ Other (specify) _____

Above grade building construction

Wood frame ☐ Poured concrete ☐ Stone ☐
Brick ☐ Concrete block ☐ Other _____

Foundation construction

Fieldstone ☐ Solid top concrete block ☐ Slab on grade ☐
Poured concrete ☐ Open top concrete block ☐ Other _____

Is the owner aware of any additions made to the original design of the structure? (please specify)

_____
_____

Utilities

Sewer:
Public ☐
Private ☐
Other _____

Water:
Public ☐
Private ☐
Other _____

Spring ☐
Well ☐

Hot water heater type:
Gas ☐ Electric ☐
Oil ☐ Other _____

Heating, ventilation, and air conditioning systems

Primary heat type:
Hot air ☐
Hot water ☐
Steam radiator ☐
Electric ☐
Other _____

Fuel type (heat):
Natural gas ☐
Fuel oil ☐
Electric ☐
Wood ☐
Other _____

Secondary heat type:
Kerosene ☐
Wood stove ☐
Electric ☐
Propane ☐
Other _____

Ventilation types:
Attic fan ☐
Kitchen hood ☐
Bathroom fan ☐
Other _____

Whole house fan ☐
Air filtration ☐
Induced fireplace ☐
Other _____

Air conditioning:
Window units ☐
Furnance unit ☐
Electric ☐
Other _____

O'BRIEN & GERE

Indoor Air Quality Building Survey

Date:
Collector:
Affiliation: O'Brien & Gere

Basement type

None ☐ Full ☐ Half ☐ Slab on grade ☐ Vented crawlspace ☐ Unvented crawlspace ☐ Other _____

If slab on grade, is there a garage with occupied space above? _____

Basement depth below grade (feet)

Front _____ Rear _____ Side 1 _____ Side 2 _____

Basement characteristics

General:
No. of rooms ☐
Bathroom ☐
Basement use _____

Floor:
Earth ☐
Concrete ☐
Tile ☐
Carpet ☐
Other _____

Walls:
Finished ☐
Unfinished ☐
Painted ☐
Sheetrock ☐
Other _____

Paneling ☐
Tile ☐
Insulated ☐
Uninsulated ☐

Check if present:
Fireplace ☐
Sump pump ☐
Floor drains ☐
Interior walls ☐

Elevator ☐
Ash cleanout ☐
Water damage ☐
Jacuzzi/hot tub ☐

French drain ☐
Floor cracks ☐
Wall cracks ☐
Other _____

Does the basement have a moisture problem? _____
Does the basement ever flood? (specify frequency) _____
Is there water in the sump or drains? _____
Is there evidence of possible mold? _____
Does the basement have a radon system installed? _____
Has there been recent purchases of furnishings (carpets, rugs, linoleum, tile, or funiture) or remodeling (new construction,roofing, or floor stripping? (please specify) _____

Chemical usage, exposure and storage

Identify occupant hobbies:
Painting ☐
Stained glass ☐
Jewelry making ☐

Electronics ☐
Woodworking ☐
Furniture refinishing ☐

Model making ☐
Auto repair ☐
Other _____

Where in the structure are these hobbies conducted? _____
Does the occupants' job require chemical exposure? _____
If so, where are the occupants clothes cleaned? _____

Has the structure been fumigated in the last year? _____
If so, is fumigation regularly performed? (how often) _____
Are pesticides frequently applied to lawn or garden? _____
If so, are they stored on the property? _____

Are dry-cleaned clothes kept in vicinity of sampling? _____
Is there smoking in the building? _____
Have cleaning products been used recently? (when & type) _____
Has painting/staining been done recently? (when & where) _____

O'BRIEN & GERE

Indoor Air Quality
Building Survey

Date:
Collector:
Affiliation: O'Brien & Gere

Identify chemicals stored in the basement, or garage if structure is slab on grade (include fuels, solvents, cleaners, etc.)

Brand	Product	Amount stored

Comments

Is there any other information about the structural features of this building, the habits of its occupants or potential sources for chemical contaminents to the indoor air that may be of importance in facilitating the evaluation of the indoor air quality of the building?

Sampling Locations (sketch plan views)

Basement | First Floor | Outdoor (indicate wind direction)

O'BRIEN & GERE

Building Survey - Chemical Inventory Attachment

Preparer's Name: _____ Date: _____

Preparer's Affiliation: _____ Room/Area: _____

Site Name: _____ Address: _____

Identify chemicals stored in the basement (or 1st floor living space/garage if structure is slab on grade). Include fuels, solvents, cleaners, polyresins, etc. Use separate inventory sheet for each room/area surveyed

Brand/Product	Volatile ingredients/CAS Nos.	Amount stored

OBG

THERE'S A WAY